Filing Receipt

Received - 2021-09-30 02:57:55 PM
Control Number - 52373
ItemNumber - 160

PUC PROJECT NO. 52268

CALENDAR YEAR 2021 – WORKSHOP AGENDA ITEMS WITHOUT AN ASSOCIATED CONTROL NUMBER	§ § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

PUC PROJECT NO. 52373

REVIEW OF WHOLESALE ELECTRIC MARKET DESIGN	§ §	**PUBLIC UTILITY COMMISSION OF TEXAS**

CALPINE CORPORATION'S ERCOT MARKET DESIGN RECOMMENDATIONS

I. Introduction

Calpine Corporation ("Calpine") appreciates the opportunity to provide market design recommendations for discussion during the October 14, 2021 Commission Work Session. By way of background, Calpine is America's largest generator of electricity from natural gas. In Texas specifically, Calpine owns approximately 9,000 MW of dispatchable generation and provided approximately 13% of ERCOT's electricity needs in 2020.

Calpine supports the Commission's focus on reliability and herein offers suggestions that are intended to align incentives and market participant responses consistent with principles that are market based, reduce volatility, and which provide value for dispatchable resources that bolster reliability. The Commission has all the necessary legal authority required to enhance both operational and planning reliability.

Aside from the urgency for the Commission to address these matters, a key issue facing policy makers and the Electric Reliability Council of Texas ("ERCOT") is the reliability challenge associated with increased energy supply from subsidized intermittent resources and the resulting economic stresses these subsidies create. These factors threaten the ongoing economic viability of firm, dispatchable resources that continuously follow load changes and reliably provide power as needed. Current proposals in the US Congress to significantly expand taxpayer subsidies for intermittent generation, as well as the possible

creation of a national clean energy standard, will result in the State of Texas experiencing a massive increase in highly subsidized intermittent renewables, adversely impact the economics of firm dispatchable generation and threaten grid reliability unless the ERCOT market structure fundamentally changes.

The first change the Commission must take is to mandate a reliability standard. Unlike other markets in the US, the ERCOT market currently has a reliability "target", but has no mechanisms to ensure this target is met, instead it relies solely on market "signals". A target is inadequate given the fallout from Winter Storm Uri, societal expectations of reliability, and the expected amount of new subsidized intermittent generation on the grid. Instead, the Commission must mandate a reliability standard, and concurrently it must adopt market-based mechanisms to ensure the standard is met. Calpine believes a reasonable standard is a 1-in-10 Loss of Load Expectation, however, Calpine could support adoption of a more conservative reliability standard and as a policy matter understands the need to balance consumer costs with reliability.

In addition to mandating a reliability standard Calpine is recommending a suite of actions the Commission can take immediately and over the longer term to incentivize new investment in as well as retention of the firm, dispatchable generation needed to maintain reliability in a cost-effective manner.

Calpine respectfully requests the Commission consider the following ERCOT market design modifications.[1]

1) Immediate:
    a. Establish a reserve margin standard and modify the current Operating Reserve Demand Curve ("ORDC") to help achieve the 1-in-10 standard.
    b. Require ERCOT to continue to procure reserves at the current 6,500 MW level, allocating some of those costs to intermittent resources to mitigate costs to Load.

[1] Calpine has provided a detailed list of Recommendations as an Appendix to this filing.

c. Expand the ERS program as long as it is limited to load, excluding backup generation, and requiring that the deleterious effects of ERS deployments on energy prices to be appropriately accounted for in any energy pricing run.

2) Longer-term:

a. To make sure that the ERCOT grid meets the mandated reliability standards, a direct mechanism is needed to ensure that sufficient resources are available to meet reliability standards. Calpine has reviewed the "LSE Reliability Obligation" proposal that will be submitted today by E3 and R Street, and while there are many details to be worked out, we believe something along these lines is structurally needed for assuring ERCOT meets its reliability goals. However, Calpine believes that implementing such a mechanism may take some time and that, in the interim, the Commission should decide how much firm, dispatchable generation it needs to retain on the system and require LSE's to procure that amount of resource on a forward basis.

1. The Commission Must Mandate A Reliability Standard And Adopt Market Changes To Ensure Those Standards Are Met

In ERCOT's current market structure, reliability is an "output". The energy, ancillary service, and ORDC components determine market revenues, and suppliers make individual decisions about whether to invest in or retire generation based on these signals. The result is a reliability outcome based purely on the market without regards to policymaker preferences for increased (or decreased) reliability. As noted in the ERCOT-sponsored report, "Estimation of the Market Equilibrium and Economically Optimal Reserve Margins for the ERCOT Region for 2024" performed by Astrapé Consulting, ERCOT's current market structure theoretically leads to a Loss of Load Expectation (LOLE) of once every two years, or 1-in-2.[2]

[2] http://www.ercot.com/content/wcm/lists/219844/2020_ERCOT_Reserve_Margin_Study_Report_FINAL_1-15-2021.pdf, Page 5

Other regions mandate a reserve margin that lead to an LOLE of once every 10 years, or 1-in-10. This is a reasonable target, and the Commission should apply that industry standard in this proceeding. However, Calpine also supports adoption of a more conservative reliability standard and as a policy matter understands the need to balance consumer costs with reliability.

By mandating a reliability standard, the Commission would fundamentally change the dynamics of the market structure; reliability would no longer be an "output" that depends completely on the market response to energy, ancillary service, and ORDC values, but would instead become an "input" and be a definitive goal for the rest of the market design.

In order to meet the mandated reliability standard, Calpine is recommending a suite of actions the Commission can take immediately and over the longer term to incentivize new investment in as well as retention of the firm, dispatchable generation needed to maintain reliability in a cost-effective manner.

2. Immediate Market Design Recommendations

a. Change The ORDC To Incentivize New Investment

The first change the Commission should mandate is to expand the ORDC to incentivize new investment. Market participant expectations of real-time prices, including both energy and ORDC payments, inform the Day Ahead Market ("DAM") and Ancillary Service ("AS") markets and ultimately drive decisions about long-term resource investment. The ORDC is an existing tool with tunable parameters that can be quickly changed so that it starts producing higher prices, and thus a larger real-time response from both generation and load resources long before the system is nearing a crisis; at the same time, forward expectations of additional revenues incentivizes new investment in generation that can dispatch during tight system conditions to meet the higher demand. These changes can be made easily and quickly.

The Commission and ERCOT have previously recognized that ORDC changes impact investment. In fact, since 2018, ERCOT has funded an independent biannual study[3] to evaluate how the ORDC shape, together with other market dynamics, are impacting overall ERCOT reliability. An important finding of these studies is that by shifting the ORDC, the Commission can incentivize new investment and increase reliability at a nominal cost. In fact, in 2018, in the face of concerns about dwindling Summer reliability, the Commission undertook Project No. 48551 to modify the ORDC parameters to create new investment. The Commission decision at that time was to shift the ORDC to incentivize new investment and a better operational response, and successfully so, but the shift was not sufficient to the extent necessary to secure the desired expansion of system capacity.

If the Commission mandates a reliability standard such as 1-in-10, an immediate action it should also undertake is to modify the ORDC as discussed. This will incentivize investment to achieve the new reliability objective. To assist the Commission in determining how to amend the ORDC parameters, Calpine engaged Astrapé Consulting to perform a preliminary analysis similar to the analysis performed for ERCOT in the 2020[4] reserve margin study, but with updated parameters to achieve a 1-in-10 LOLE.

Three key variables determine the shape of the ORDC, and thus how much suppliers can expect to receive under various system conditions. Following is a brief description of those variables, and how they were modeled by Astrape.

The first variable is the Value of Lost Load, or ("VOLL"): In the ERCOT market design the VOLL is currently $9,000/MWH and determines the high system-wide offer price cap ("HCAP"). It acts as both a carrot and a stick. It rewards resources that can perform at high levels in times when energy is most scarce and correspondingly leads to higher expected costs of energy over time and higher forward prices. It also penalizes resources that are not able to provide energy when it is most scarce, forcing the resources to buy

[3] In 2016, the PUC directed ERCOT to conduct an assessment of the Economically Optimal Reserve Margin (EORM) and the Market Equilibrium Reserve Margin (MERM) for the ERCOT region on a biannual basis. https://interchange.puc.texas.gov/Documents/42302_43_915925.PDF

[4] http://www.ercot.com/content/wcm/lists/219844/2020_ERCOT_Reserve_Margin_Study_Report_FINAL_1-15-2021.pdf

back the energy at potentially high prices. Finally, it also provides a strong load reduction incentive for industrial on indexed prices.

The Commission has recently expressed interest in reducing the HCAP to $4,500/MWH, and Calpine asked Astrapé Consulting to assume this level, as well as a $6,000/MWH HCAP.

The second key variable that determines the shape of the ORDC is the Minimum Contingency Level ("MCL"), sometimes referred to as the "Value of X": The MCL signifies the level of reserves at which the ORDC reaches the HCAP, which is currently $9,000/MWH. It represents a level of reserves below which ERCOT is at a higher risk of shedding load. Given that ERCOT's current procurement level of Responsive Reserve is 2,800 MW, ERCOT is expressing that this is the minimum level of reserves that ERCOT wishes to carry and that at this level reserves should be priced at the VOLL. Thus, the Value of X should be 2,800 MW instead of the current level of 2,000 MW. For the purpose of this analysis, Calpine asked Astrapé to assume X=2,800 for all the scenarios.

Finally, the third key variable that determines the shape of the ORDC are two mathematical parameters, Mu and Sigma. Together, these two parameters determine the general slope of the ORDC curve and how far to the right it extends. For the purposes of this analysis Calpine asked Astrapé to estimate the adjustments required to achieve a reliability standard of 1-in-10 LOLE. The initial adjustments were simple scalars applied to both Mu and Sigma and were increased until the MERM objective was satisfied.

Astrapé's analysis is included as an attachment. The analysis suggests that a shift from the current base case expectation of an LOLE of 1-in-2 years could be expanded to an LOLE of 1-in-10 years for an overall increase to wholesale prices less than 1.5% or approximately $0.65/MWh. Key findings from the analysis regarding parameter changes to meet the desired LOLE are included in the table below.

VOLL ($/MWh)	MERM (%)	Wholesale Price ($/MWh)	Wholesale Price Increase Over Base ($/MWh)	Wholesale Price Increase Over Base (%)	LOLE (Events Per Year)
Base	12.25%	46.49	-	-	0.5
9,000	15.75%	46.99	0.50	1.07%	0.1
6,000	15.75%	46.74	0.25	0.54%	0.1
4,500	15.75%	47.14	0.65	1.41%	0.1

This nominal increase in energy costs provides a tremendous return on investment in the form of increased reliability, and merits serious further consideration as the Commission evaluates proposals to improve reliability in the ERCOT market. The specific parameters Calpine recommends changing are in contained in the Appendix to this filing.

b. Maintain Increased Procurement of Reserves And Allocate Some of Those Costs To Renewables

Calpine supports ERCOT's procurement of additional reserves that total 6,500 MW, which have already been implemented. These reserves are procured through a market mechanism and so no change is needed, other than to make this level permanent. However, the Commission and ERCOT should modify how the costs of these reserves are allocated. Today, these costs are entirely paid for entirely by load. But, the reserve requirements have been increased dramatically in the last year, and some of the costs should be borne by intermittent resources because they are driving the increased need for the additional reserve procurement. Calpine proposes that in the first instance, ERCOT should determine how much of the need for the reserves is created by variability due to load versus generation, and split the allocation of the costs on that basis. However, Calpine believes that the costs attributable to generation should be allocated only to intermittent resources that are driving the increased need for the additional reserve procurement. Furthermore, consistent with the increased Non-Spin Reserve Service ("NSRS") procurement by ERCOT, Calpine recommends adding a requirement for offline NSRS to also include the same offer floor as on-line

NSRS. This price floor will help ensure that the impact of additional reserves on real-time prices are mitigated.

Additionally, the Commission should evaluate the standards of participation in RRS regarding energy storage. Currently, the standard for storage participation is based on a 1-hour qualification, which has permitted short duration 1-hour batteries to be paid around the clock for RRS despite their actual physical capability being only 1 hour, not 24 hours. Allowing short duration 1-hour batteries to participate in RRS decreases reliability because the service is being provided by short duration resources rather than resources that have the duration to continuously supply energy deployments from RRS. During Winter Storm Uri, energy from RRS was deployed at least four times for durations longer than 1 hour.[5] In such circumstances, 1-hour battery resources that are awarded may not be able to physically deploy for the duration of the time the resource is released to SCED. Calpine recommends increasing the duration requirement to provide RRS or ECRS services and Non-Spin to at least match the longest RRS deployment experienced during Uri.

c. Expand ERS Appropriately

Expanding the current ERS program could be done quickly to help increase reliability as long as it's implemented appropriately. Unless done correctly, these reliability deployments have a deleterious effect on energy prices, and thus would be counterproductive for incentivizing generation response, and must be appropriately accounted for in any energy pricing run. Not including the impact of these load reductions on energy prices may lead to price reversals that undermine the purpose of this proceeding. Furthermore, the Commission should limit participation in the emergency response service program ("ERS") to only load. All generation should positively contribute to price formation and participate in SCED. Generation that is financed using an ERS capacity payment is on an uneven playing field and takes revenue from the market needed to support system reliability. Moreover, from a reliability and economic

[5] http://www.ercot.com/content/wcm/key_documents_lists/214010/February_2021_ERCOT_Operations_Report_Public.docx

efficiency perspective, pre-deployment of awarded ERS capacity should not be permitted. ERCOT does not know how much ERS capacity pre-deploys because it is not telemetered, so expectations regarding actual ERS deployment are uncertain because of pre-deployment. Additionally, ERS that pre-deploys is doing so in response to real time prices, so the market is paying resources for a service that they would provide for free. A thorough review of resources providing ERS should be undertaken to ensure that critical loads are not participating in this service.

3. Longer Term Market Changes

a. The Commission Must Adopt A Direct Mechanism To Ensure that Sufficient Resources Are Available To Meet Reliability Standards.

If the Commission adopts a reliability standard, it will not be enough for the Commission to adopt changes to the ORDC and AS markets to fully address reliability concerns. Instead, a backstop mechanism is critical to ensuring Load Serving Entities ("LSEs") have acquired enough reliable capacity to meet their load obligation plus a reserve margin. Calpine has reviewed drafts of the whitepaper submitted today by E3 and R Street Institute to create a LSE Reliability Obligation[6] and Calpine supports many of the concepts contained therein because they provide a set of market based tools that can help ensure reliability in the ERCOT market, as well as meet the reliability requirements specified in SB3.

Adopting the basic structure of the E3/R Street proposal, or something similar, will likely take some time to fully implement because of the complexity involved to ensure the resulting proposal will create a functional and stable market design.

In the meantime, working in conjunction with ERCOT, the Commission should decide how much firm, dispatchable generation ERCOT needs to retain on the system, and require individual LSE's to procure their load ratio share of that amount on a forward basis. This would not require a centralized ancillary service or capacity market. Instead, each LSE would be free to negotiate their own terms and conditions

[6] As noted, Calpine has reviewed a draft but not the final that is being submitted today, so may not be aware of some changes contained in the final product.

with firm, dispatchable resources. The requirement can be monthly or seasonal, and only dispatchable generation that can provide uninterruptible power for 24 hours should be eligible and procured on a one-year forward basis. Resources procured under this mechanism would agree to either provide energy or be available for reliability commitment during the periods of highest net load during the time period selected. Resources that do not perform as expected should be penalized for non-performance.

Respectfully submitted,

By: */s/ Diana Woodman Hammett*

Diana Woodman Hammett
Texas Bar No. 21942300
Vice President & Managing Counsel, Legal Department
CALPINE CORPORATION
Direct: (713) 820-4030
Email: diana.woodmanhammett@calpine.com

Bryan Sams
Director Government and Regulatory Affairs
CALPINE CORPORATION
Direct: (512) 632-4870
Email: bryan.sams@calpine.com

CALPINE CORPORATION'S ERCOT MARKET DESIGN RECOMMENDATIONS

Calpine respectfully requests the Commission consider the following market design modifications in its work sessions and market design deliberations:

Immediate:

- Reform the Operating Reserve Demand Curve ("ORDC") to ensure it produces revenues sufficient to attract and retain dispatchable generation including changes to the Value of Lost Load ("VOLL"), Value of X and the Loss of Load Probability ("LOLP") parameters.
    - Calpine recommends the following combinations of reforms to ORDC parameters for Commission review[7]:

Scenario	*VOLL*	*Value of X*	*Sigma/Mu Adjustment Factor*
1	4,500	2,800	62.5%
2	6,000	2,800	79.5%

- ERCOT should procure Ancillary Service ("AS") quantities on a daily or longer-term basis as may be necessary to match the desired level of reliability for the ERCOT market, including retention of the changes of this nature made in 2021. Moreover, the cost of additional procurement should be assigned to intermittent resources.

- Review and amend AS market design qualifications that undermine long-term reliability. Specifically, the duration requirements for participation in the Responsive Reserve Service ("RRS"), ERCOT Contingency Reserve Service ("ECRS") and Non-Spinning Reserve Service ("NSRS") markets should be substantially expanded to support long term reliability.

- Expand the use of the ERS program, ensuring use of out of market capacity reductions procured from Load (ERS, TDU Load Management) do not interfere with price formation and limit ERS participation to Load.

Long Term

- Adopt a direct mechanism such as the "LSE Bilateral Load Obligation" to ensure ERCOT is procuring generation with sufficient level of load carrying capability to match the desired level of reliability for the ERCOT market.

[7] Note that the Astrape analysis is preliminary and based on public data. Calpine recommends the Commission order ERCOT to work with Astrape to finalize the analyze the analyze using actual ERCOT proprietary data.